Student Learning in the Principles of Economics Course at Predominantly Black and White Universities: Lessons from Two Schools

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Article:

What Do We Know About The Economic Education Of African American College Students?

Despite attempts within the economics profession over the past decade to increase the representation of minority groups in economics, the low number of African Americans majoring and seeking advanced degrees in economics is striking. As Paul Ruffins (1996, 18) notes, "there is probably no other field where the number of African American Ph.D.s is so low, relative to the number of undergraduates who take courses in the discipline, especially in light of the number of African Americans with related professional degrees such as Master's of Business Administration or Certified Public Accountancy." The low representation of blacks in the economics profession raises public policy as well as diversity concerns. In particular, as many black economists point out, "the African American community, as a whole, suffers when there aren't any African American economists at the conference table when important decisions are being made." (Ruffins 1996, 18) During the past two decades, attempts to increase the number of black economists have focused primarily on advanced undergraduate and graduate-level education.[1] Despite these efforts, the number of blacks in the economics profession remains low. Surprisingly, little attention has been paid to the effectiveness of basic undergraduate economic education for blacks, especially those attending historically black colleges and universities (HBCUs). Traditionally and historically, HBCUs have played a critical role in the education of black students in the U.S. While HBCUs account for approximately 15 percent of overall black enrollment in institutions of higher education in the U.S., they produce a disproportionate 28 percent of black graduates (Digest of Education Statistics 1998, Tables 206, 218 and 265). We are particularly interested in determining whether the learning outcomes of students enrolled in introductory-level economics courses at HBCUs are similar to those of students at comparable traditionally white colleges and universities (TWCUs). Given the disproportionate share of black graduates produced by HBCUs, lower levels of student learning in introductory economics courses at HBCUs could potentially be a factor limiting the number of black students who seek careers in economics.

While much has been written recently about the overall effectiveness of undergraduate economic education in the U.S. (see Becker 1997, e.g.), very little systematic research has been done on the economic education of black college students. Consequently, we know relatively little about the learning outcomes of black undergraduate economics students at HBCUs or elsewhere. A recent study (Walstad and Allgood, 1999) analyzing economics scores for 12,854 students who took the Major Field Test in Business II (MFTB) as college seniors shows that black students scored nearly 10 percentage points lower than their white counterparts and 6.5 (4.5) percentage points lower than Asian (Hispanic) students. These differences remain even after controlling for variation in gender, educational aspirations, enrollment status and grade point averages.[2]

Data collected for the 1989-90 norming sample of the 30–question macro- and microeconomic versions of the *Test of Understanding College Economics (TUCE III)* paint a similar picture.[3] Black students, who make up about 3 to 4 percent of the TUCE sample, answer l.0-2.9 fewer questions correctly on the TUCE pre-test than white or Asian students and slightly fewer than Hispanic students. On the TUCE post-test the gap widens, with

blacks answering 3.5-4.7 fewer questions correctly than white or Asian students and l.2-2.7 fewer questions correctly than Hispanic students. In addition, when the TUCE results are broken down by cognitive category, the lowest gains in value-added—as measured by the difference between the TUCE pre- and post-test scores—for blacks occurs in the "implicit application" category, which includes questions requiring the highest-order thinking skills. Overall, the results suggest that black undergraduates start with less economic knowledge in their *Principles-level* economics courses, relative to other racial groups, and obtain less value-added in these courses, especially with respect to higher-order thinking skills.

Even less is known about the economic education of African Americans at HBCUs, since the TUCE dataset includes observations from only one historically black university, Albany State College (14 micro observations, 16 macro observations), too few to carry out meaningful statistical analysis. To the extent that undergraduate education in economics, especially at the *Principles* level, plays a pivotal role in encouraging or discouraging students from pursuing additional courses or advanced degrees in economics, and to the extent that HBCUs play an important role in increasing the supply of black economists, it is important to have a better understanding of the effectiveness of undergraduate economic education at HBCUs. This article takes a step toward improving this understanding by examining the learning outcomes of students—as measured by pre- and post-testing —in a *Principles of Macroeconomics* course from a representative HBCU and comparing them to those of students from a broadly comparable TWCU. We find that while students at the HBCU start the course with a lower level of economics knowledge, by the end of the course they perform similarly to the students at the TWCU, on average.

Such an outcome suggests (l) that students finishing introductory economics courses at HBCUs do not necessarily experience lower levels of learning compared to students at comparable TWCUs, and (2) that there are causes other than differences in *Principles*-level economics education at HBCUs and TWCUs that are responsible for the relatively low number of African American students pursuing careers in economics.

Data Characteristics and Methodology

Data was collected from students in *Principles of Macroeconomics* courses taught at North Carolina A&T State University (NCAT), a historically black university, and the University of North Carolina at Greensboro (UNCG), a traditionally white university, during the fall 1997 semester, the spring 1998 semester, and the spring 1999 semester. The two schools share a similar set of characteristics that make them especially attractive for this study. In particular, both schools:

- are medium-sized state universities located within the same city; both are members of the University of North Carolina system.
- are viewed as regional universities with mostly in-state students and compete for many of the same students.
- offer a mix of undergraduate and graduate degrees, but focus primarily on undergraduate education.
- have economics departments located in a School of Business and Economics and offer BA and BS degrees in economics.
- are dominated by students of a single racial/ethnic category.

Sharing a broad base of common characteristics helps to reduce the number of outside influences that may differentially affect student learning at the two institutions. However, while the two universities are comparable in many respects, there are differences in a variety of institutional characteristics—listed in Table l—that could potentially affect learning outcomes. The most dramatic difference among these characteristics is the racial/ethnic makeup of the two schools; black students at NCAT represent 92 percent of the total undergraduate enrollment while white students at UNCG account for 78 percent of the undergraduate enrollment. Another difference between the two schools is class size in the *Principles of Macroeconomics course.* The average *Principles of Macroeconomics* class at NCAT is a little less than half the size of the comparable UNCG class, based on our sample data. In addition, total undergraduate enrollment is about 50 percent larger at UNCG than at NCAT, the percentage of women students is higher at UNCG, and entering SAT scores are about 100 points

higher at UNCG than at NCAT. Understanding how these institution-specific differences affect learning outcomes of students at the two universities is important in determining the impact that HBCUs, in general, have on overall learning relative to TWCUs.

Our primary focus is on the performance of students on a 14—question multiple-choice test developed by the authors that covers basic microeconomic and macroeconomic concepts (four basic microeconomic questions and 10 macroeconomic questions). We faced a difficult decision when determining whether to develop our own test rather or use the often-cited *Test of Understanding of College Economics* (TUCE). We chose not to use the TUCE because we felt that it did not adequately reflect the content in the classes covered in this study and therefore would not provide an accurate assessment of course-specific learning for our students. In particular, the TUCE reflects more Keynesian-oriented content than is typically included by the instructors in our sample. The downside is that by using self-developed test questions we lose the ability to compare the outcomes of our students to national norms. While some may view this as an unsatisfactory tradeoff, we would argue that the questions used in our study cover a wide range of standard economic principles that are included in most *Principles*-level macroeconomics courses and provide a representative measure of students' economic knowledge.

Our sample includes data from six instructors, covering 15 different course sections (six sections from UNCG and nine from NCAT). At the beginning of each semester each instructor administered the test to measure students' initial knowledge of economic concepts; the same questions were repeated on an end-of-course post-test that was included as part of the course final exam. Our sample includes 459 students who completed both the pre and post tests. This represents 79 percent of the 581 students who completed the course during the period of study.[4] In addition, we collected data on a variety of student characteristics via a student questionnaire near the end of the course, as well as from institutional records. These characteristics are summarized in Table 2. As the data indicate, some of the student sample characteristics at the two schools are more similar than the institutional characteristics listed in Table 1. In particular, the fraction of females in the sample is nearly 50 percent for each institution and there is a smaller difference in average SAT scores (50 points in the sample versus 100 points for the university as a whole). Some possibly important institution-specific differences remain: a smaller percentage of students at NCAT have completed *Principles of Microeconomics* prior to taking the *Principles of Macroeconomics* course, a greater percentage of NCAT students have taken college calculus, and NCAT students appear to spend about one more hour per week studying economics than their UNCG counterparts. Overall, the representative student is a 21—year-old sophomore with approximately a 2.7 grade point average who has already taken a *Principles of Microeconomics* course and a college-level algebra or calculus course, is taking a full-time load of courses and is employed about 14 to 15 hours per week, and studies economics about three to four hours per week outside of class.

Measuring Learning Outcomes

Learning outcomes are measured both in terms of students' performance on the post-test and the difference between pre- and post-test scores, where scores indicate the number of correct responses on the tests. Overall results for the pre- and post-test are listed by school in Table 3, along with results for various subgroups. The average student at NCAT answered about one less question correctly on the pretest than his/ her counterpart at UNCG; with the difference significant at the 1 percent level.[5] While NCAT students enter the *Principles of Macroeconomics* course with relatively less economics knowledge than UNCG students, by the end of the course students at both schools score similarly on the post-test. As a result, the pre-to-post-test difference in the percentage of questions answered correctly is higher for NCAT students than for UNCG students.

Various sub-samples show similar patterns in learning outcomes. Both males and females at NCAT show larger learning gains than the corresponding groups at UNCG, while males in each institution perform slightly better than females.[6] Of particular interest is the performance of black students at NCAT relative to black students at UNCG. While the number of blacks in our sample from UNCG is small, the results are nonetheless informative. Black students at NCAT (UNCG) answer l.34 (l.06) fewer questions correctly on their pretest than the white students at UNCG in our sample, suggesting that the lower economics knowledge is related more to

race/ethnicity or other non-measured socioeconomic factors than the type of institution the students attend. However, black students at NCAT who complete the course achieve higher gains (significant at the 5 percent level) in economic knowledge than their counterparts at UNCG. Black students at NCAT increase their test scores by 2.96 questions, versus 1.95 questions for black students at UNCG and 2.21 questions for white students at UNCG, suggesting a positive "HBCU effect" on black students' learning.

However, the higher test-score gains for NCAT students may be due to individual or institution-specific characteristics such as differences in class sizes, teaching styles, economics and math preparation, or gender balance in the classroom, rather than general characteristics associated with attending an HBCU. To explore this question we employ the well- known educational production function regression-based approach that has been widely used in economic education research since the 1970s. Within this framework, a student's level of economic knowledge at the end of a course is typically modeled as a function of his/her pre-existing knowledge at the start of the course, along with other student, instructor, class, or institutional factors that may affect learning during the course. End-of-course economic knowledge is measured by students' post-test scores. As Becker (1997, 1363) points out with reference to research based on TUCE pre- and post-tests, "of all the variations considered by researchers since 1968, the only consistently significant and meaningful explanatory variables of post-TUCE scores are pre-aptitude measures such as pre-TUCE and SAT/ACT scores." We use students' pre-test scores, as well as SAT scores and student grade-point averages (GPA) obtained from institutional data, as our measures of students' initial aptitude.[7] Along with students' pre-test scores, SAT scores and GPA, our full set of explanatory variables includes the following:

HBCU	Institutional dummy; HBCU=l for NCAT and 0 for UNCG
INSTRUCTORχ	0-1 instructor dummies; χ = 1 to 6 (4 instructor dummies for NCAT professors and 2 instructor dummies for UNCG professors)
CUMCREDIT	Cumulative semester hours earned at the start of the semester
CLASSSIZE	Number of students enrolled in the course at end of semester
GENDER	GENDER=0 if a student is male and 1 if female
AGE	Age of student
WORKHOURS	Average number of student hours worked perweek, including college work study
PREVMICRO	PREVMICRO=l if a student had a previous microeconomics course, 0 otherwise
SEMHOURS	Number of semester hours of courses the student was enrolled in during the semester
MATHLEVEL	Highest math course completed at start of semester; MATHLEVEL=l for high school algebra, 2 for college algebra, 3 for college calculus (l semester), and 4 for more than 1 semester of college calculus
STUDYTOTAL	Average number of hours per week spent studying for all courses
STUDYECON	Average number of hours per week spent studying economics

We are particularly interested in the coefficient on the HBCU dummy variable but we also include 0-1 instructor dummy variables to account for the possibility that instructor-specific factors, rather than general institutional ones, may be responsible for the differences in learning outcomes illustrated in Table 3. Normally in ordinary least squares regression, when a set of dummy variables is included in the regression, researchers leave

one out and interpret the estimated dummy variable coefficients with respect to the dropped dummy variable. However, because the institution dummy (HBCU) is a linear combination of the remaining instructor dummies even after one of the instructor dummy variables is dropped from the regression, the standard dummy-variable approach is not feasible. To overcome this estimation problem, we follow Suits (1984) and restrict the sum of each school's instructor dummies to equal 0, with the restrictions weighted by the proportion of each school's students taught by a particular instructor, as suggested by Kennedy (1986). All results reported were obtained by restricted least squares, implementing the two sets of instructor dummy restrictions. Our initial model includes the full set of independent variables listed above, using students' posttest scores as the dependent variable.[8] We then obtain more parsimonious model specifications by dropping variables that are not significant at the 5 percent level. Due to missing observations for some student-reported variables, the sample size varies across the different model specifications.

The first set of regression results in Table 4 illustrates Becker's point about the lack of significant explanatory variables. Besides the variables indicating a student's aptitude or previous knowledge, only the AGE variable is statistically significant at the 5 percent level in model 1. The HBCU dummy variable is positive, but insignificant. When the insignificant (at the 5 percent level) variables are dropped from the regression specification (model 2 in Table 4), the HBCU variable remains positive and becomes statistically significant. The results show that after accounting for instructor differences and variation in student attributes, there is a significant school effect, adding two-thirds of a point to NCAT students' post-test scores.

One possibility for the positive school effect in model 2 is that it is simply capturing the effects of the omitted variables, many of which tend to be highly correlated with the HBCU variable (i.e. there are school- specific differences in many of these variables). To examine this possibility, in model 3 we include four variables for which there are significant differences between the two schools (class size, gender, previous microeconomics course, and previous math courses) and drop the HBCU dummy variable. In this model class size becomes a significant variable, with a negative coefficient, suggesting that part of the positive "HBCU effect" in model 2 is due to smaller class sizes. Given the average difference in class size between UNCG and NCAT of 32 students, the results for model 3 suggest a .45 question reduction in the post-test score for UNCG students due to larger class sizes. Accounting for differences in class size reduces the pre-to-post test differential between the two schools roughly in half. The bottom line: students at both schools end up with similar post-test results and similar gains in learning after adjusting for student (age, GPA, SAT scores, and pre-test scores) and school-specific (class size) factors.[9] Model 4 drops the insignificant (at the 5 percent level) school-related variables from model 3 and adds the HBCU dummy variable back in to test for an independent "HBCU effect" on learning. Both the class size variable and the HBCU dummy variable become statistically insignificant, indicating the multicollinearity between the two variables. Overall, the results suggest that there is neither a positive nor a negative independent "HBCU effect" on learning outcomes in the *Principles of Economics* course. In general, according to our sample data, economics students with similar personal educational characteristics, attending comparable representative HBCUs and TWCUs, leave the *Principles* course with similar economic skills after accounting for differences in class size.

Summary and Conclusions

What do we make of these results? While the analysis focused on only two schools, the evidence for these schools suggests that students at HBCUs are likely to learn as much in the *Principles* course as those at comparable TWCUs, especially when class sizes are small, despite starting from a lower level of economic knowledge. The results therefore suggest that economics students at HBCUs are not inherently at a disadvantage—when compared to their counterparts, both white and black, at comparable TWCUs —in terms of learning outcomes in introductory economics courses. More research is needed to determine whether these results are generalizable across a wider variety of schools, but there is a paucity of data currently available to analyze this issue, especially in the nationally normed TUCE database. Thus, this study should be viewed as an initial attempt to systematically compare the learning outcomes of *Principles of Economics* students at broadly comparable HBCUs and TWCUs and to better understand the role of HBCUs in the economic education of African American college students.

Our study also raises additional questions that require further research. For example, our regression results show that instructor-specific influences play a significant role in the learning outcomes of students, especially at the HBCU. More research is needed to better understand the roles that instructors, pedagogical techniques, institutional environments and class-size play in the education of African American students. Our results indicate that these factors may be influential.[10]

Moreover, what implication do our results have for increasing the number of African Americans considering economics majors or advanced degrees in economics; i.e. increasing the supply of black economists? They suggest that the reason for the low numbers of blacks pursuing economics degrees at the undergraduate and graduate level is not one of inferior *Principles*-level economic education at HBCUs, where a disproportionate share of black students earn their degrees. Again, additional research is necessary to better understand the dynamics underlying the continuing low percentage of black students who pursue careers in economics. As Collins (2000, 146) notes, "the very low numbers of minority economists strongly suggest that at key junctures along the pipeline to becoming a professional academic economist, minority individuals seem more prone to exit than do nonminorities." The same observation can be made for professional economists outside of academia.

TABLE 1
Institutional Characteristics

	North Carolina A&T State University	University of North Carolina, Greensboro
Fall Undergraduate Enrollment (1997)		
Total	6,492	9,741
% Black	0.924	0.160
% White	0.059	0.782
% Male	0.489	0.341
% Female	0.511	0.659
% Full-time	.892	.806
% Part-time	.118	.194
Freshman SAT Scores		
1200 or Greater (%)	.022	.121
1100-1199 (%)	.067	.177
1000-1099 (%)	.185	.259
900-999 (%)	.270	.264
800-899 (%)	.295	.143
700-799 (%)	.156	.033
700 or Less (%)	.005	.003
Average	926	1026
Economics Class Size, Mean	25.9	58.0

Source: All data except class size were obtained from *Institutional Profiles, University of North Carolina, 1998–99 Edition*, Program Assessment and Public Service Division, University of North Carolina-General Administration, Appendices C and E. [Online: *http://www.ga.unc.edu/publications/*]
Average economics class size is based on institutional data covering observations in our sample.

TABLE 2
Student Characteristics by School

Individual Characteristic	North Carolina A&T State University			Univ. of North Carolina, Greensboro		
	No. of Observations	Mean	Std. Dev.	No. of Observations	Mean	Std. Dev.
GPA Prior to Course	167	2.74	0.60	273	2.68	0.67
Cumulative Credit Hours Earned	167	59.25	25.30	273	47.84	25.93
SAT Verbal Score	139	481.08	71.94	191	500.79	86.66
SAT Quantitative Score	139	489.14	75.15	191	518.95	82.83
Year in College	130	2.50	0.84	175	2.12	0.87
Gender (0=male, 1=female)	130	0.50	0.50	188	0.54	0.50
Age	130	20.64	2.17	174	21.81	5.25
Race/Ethnicity*	128	1.16	0.76	182	3.49	1.42
Work Hours per Week	117	13.78	13.64	167	15.20	14.26
Current Semester Hours	129	14.81	3.14	173	14.00	2.97
Previous Microeconomics Course (0=no, 1=yes)	165	0.758	0.430	292	0.949	0.221
Highest Math Level Completed**	126	3.02	0.64	171	2.35	0.90
Total Study Hours per Week	125	12.14	7.73	170	12.99	9.40
Economics Study Hours per Week	125	3.74	6.02	171	2.91	2.02

* **Race/Ethnicity:** *1=African American, 2=Hispanic-American, 3=Asian-American, 4=Caucasian-American, 5=Native-American, 6=African or Caribbean, 7=Other.*
****Highest Math Level:** *1=High School Algebra, 2=One Semester of College Algebra, 3=One Semester of College Calculus, 4=Two or more semesters of College Calculus.*

TABLE 3
Performance on Pre- and Post-Test By School and Subgroup

Average Scores on Test	North Carolina A&T State University				Univ. of North Carolina, Greensboro			
	Pre-test	Post-test	Difference	Number of Obs.	Pre-test	Post-test	Difference	Number of Obs.
Total	**4.38****	**7.28**	**2.89****	**167**	**5.28**	**7.11**	**1.82**	**292**
Male	4.52**	7.57	3.05*	65	5.94	8.16	2.22	87
Female	4.20*	7.20	3.00*	65	4.94	7.01	2.07	101
Blacks	4.34	7.30	2.96*	122	4.62	6.57	1.95	37
Whites	-	-	-	4	5.68	7.89	2.21	129
Percentage of Questions Answered Correctly, Full Sample	0.31	0.52	0.21*	167	0.38	0.51	0.13	292

A * (**) indicates that the value for NCAT students is significantly different from the corresponding value for UNCG students at the 5% (1%) level using a two-tailed test. The averages for white students at NCAT were not computed because of the low number of observations in the sample. Because the data on race/ethnicity and gender is self-reported, some observations are missing.

TABLE 4
Factors Affecting Learning Outcomes: Regression Results*

Variable	Model 1			Model 2			Model 3			Model 4		
	Coeff.	Std. Err.	p-value	Coeff.	Std. Err.	p-value	Coeff.	Std. Err.	p-value	Coeff.	Std. Err.	p-value
INTERCEPT	-7.536	2.826	0.008	-5.061	2.093	0.016	-3.518	2.261	.121	-5.610	2.556	.029
PRETEST	0.360	0.075	0.000	0.354	0.072	0.000	.349	.073	.000	.354	.072	.000
SATTOTAL	0.004	0.001	0.000	0.004	0.001	0.000	.004	.001	.000	.004	.001	.000
GPA	0.551	0.264	0.038	0.455	0.234	0.053	.477	.243	.052	.445	.236	.061
HBCU	0.968	0.870	0.268	0.640	0.263	0.016				.949	.864	.274
AGE	0.334	0.097	0.001	0.236	0.083	0.005	.216	.084	.011	.236	.083	.005
CLASSSIZE	0.014	0.021	0.507				-.013	.007	.083	.008	.021	.717
GENDER	-0.318	0.276	0.251				-.317	.268	.239			
WORKHOURS	-0.013	0.011	0.226									
PREVMICRO	-0.488	0.400	0.224				-.066	.382	.863			
CUMCREDIT	-0.009	0.006	0.178									
SEMHOURS	0.002	0.054	0.972									
MATHLEVEL	0.242	0.171	0.160				.150	.168	.374			
STUDYTOTAL	-0.023	0.019	0.222									
STUDYECON	-0.034	0.029	0.239									
INSTRUCTOR1 (NCAT)	0.557	0.097	0.000	0.589	0.089	0.000	.571	.093	.000	.586	.090	.000
INSTRUCTOR2 (NCAT)	-2.302	0.755	0.003	-2.665	0.612	0.000	-2.766	.632	.000	-2.583	.651	.000
INSTRUCTOR3 (NCAT)	-1.909	0.407	0.000	-1.878	0.368	0.000	-1.686	.385	.000	-1.916	.383	.000
INSTRUCTOR4 (NCAT)	-0.097	0.884	0.912	-0.464	0.827	0.576	-.861	.847	.311	-.331	.902	.714
INSTRUCTOR5 (UNCG)	0.284	0.250	0.257	0.233	0.208	0.262	.374	.219	.089	.188	.241	.436
INSTRUCTOR6 (UNCG)	-0.214	0.189	0.257	-0.176	0.157	0.262	-.282	.165	.088	-.142	.182	.436
Sample Size		205			234			226			234	
Adjusted R^2		.443			.398			.398			.396	
F Statistic		9.997			18.104			13.404			16.245	

* Dependent Variable: Posttest Score. The qualitative results are similar when (Posttest Score – Pretest Score) is used as the dependent variable.

If not differences in the quality of early undergraduate economic education, then what explains the relatively low number of students from HBCUs pursuing professional careers in economics? Agesa, Granger and Price (1999) suggest that the research environment students are exposed to while undergraduates plays an important role in influencing decisions to pursue graduate-level economic education and become professional economists. Using data on faculty research productivity, they argue that "any interventions at HBCUs that create incentives for more faculty research in economics would have the effect of enhancing teaching effectiveness and increasing the supply of black Ph.D. economists." The evidence presented here suggests that students at HBCUs are clearly capable of performing similarly to students at comparable TWCUs at the end of a typical *Principles*-level economics course. Future research, as Collins notes, should focus on what causes black students to abandon economics as a career choice beyond this level despite these similarities in *Principles*-level learning outcomes.

Notes:

1. For example, since 1974 the American Economic Association (AEA) has sponsored an annual Summer Program for Minority Students, with the aim of increasing the number of minority students who pursue Ph.D.s in economics. Recently, the AEA's *Committee on the Status of Minority Groups in the Economics Profession* initiated a complementary mentorship program (Economics Pipeline Project) for minority students accepted or enrolled in a Ph.D. program in economics. Collins (2000) provides a summary of both programs.
2. A recent national survey commissioned by the National Council on Economic Education (*The Standards in Economics Survey 1999*) to evaluate adult (and high school student) familiarity with basic economic concepts and terms shows similar racial differences in economic knowledge.
3. The norming sample of the microeconomic version of the TUCE III contains 2,518 observations, while the norming sample of the macroeconomics version contains 2,223 observations. More detailed calculations are available from the author.

4. Like most investigations of student learning in economics, we employ a "matched sample" that leaves out students who failed to take the pre-test or the posttest. Becker, Powers and Saunders (1997) and Becker (1997) argue that leaving out students who drop the course or fail to complete student questionnaires may bias results obtained from such "censored" data. Much of our analysis is not dependent upon student questionnaire data but our results should be viewed as being conditional on a student remaining in the course for the entire semester.
5. The difference in students' initial knowledge at each school holds for both the microeconomic and macroeconomic questions. Part of the difference is possibly due to the fact that 24 percent of the NCAT students in our sample did not have a previous microeconomics course, while only 5 percent of UNCG students did not have a previous microeconomics course. However, the results for the subset of students who had previously taken a microeconomics course are similar to those in Table 3.
6. The latter result is consistent with most prior research in this area. See Anderson, Benjamin and Fuss (1994), Heath (1989) and Lumsden and Scott (1987), for example.
7. Using institutional data, rather than student-reported data reduces the type of measurement error reported by Maxwell and Lopus (1994), as well as the bias problem noted by Becker, Powers and Saunders (1997).
8. We also estimated each model using the difference between the pre- and posttest result as the dependent variable, with similar results. Kennedy (1994) and Becker (1983) argue that the difference specification is likely to avoid problems of estimation bias that may exist when using pre-test scores as a regressor in models attempting to explain variation in post-test scores. More recently, however, Kennedy and Siegfried (1997, 7) argue against this specification, noting that "this measure is questionable because students have no incentive to make an honest effort when answering the pretest questions." We follow Kennedy and Siegfried in reporting the regressions with the post-test score as the dependent variable.
9. Estimating a version of model 3 that drops the three insignificant (at the 5 percent level) institution-specific variables results in similar results.
10. The economic education literature suggests that such factors have a disproportionate effect on black students (as well as women), relative to white male students. Bartlett (1996) and Bartlett and Feiner (1992), for example, highlight the mismatch between traditional economics teaching methods and the dominant learning styles of African American students. They suggest that teaching strategies that encourage active and cooperative learning are likely to improve the educational performance of minority students and encourage further study in economics. Siegfried et al. (1991) make similar arguments. An important question is whether teachers who employ more active-learning exercises or material related to students' racial/ethnic experiences generate higher levels of learning among black students than those who primarily lecture. Lage and Treglia (1996) have found that inclusion of more gender- specific material increases economic knowledge for all students in a Principles-level course, but especially for the women. Similar results may be possible with respect to race and ethnicity. The positive effect of role models (with respect to gender and race/ethnicity) is discussed in Catanese (1991) while Jones (1988, 8) argues that "the absence of ethnic identification between HBCU students and faculty may affect the ability of these (HBCU economics) programs to attract black Americans as majors."

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